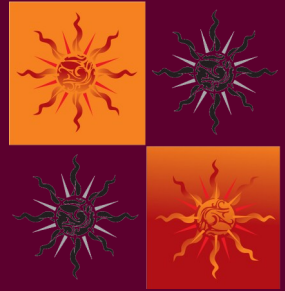




# The Four Peaks Post



Winter 2011/2012

National Weather Service — Phoenix, AZ

## Winter Edition of The Four Peaks Post Newsletter!

### Inside this issue:

- SAWS IV review & New TAF site
- 2011 Climate year in Review
- Facebook
- Flood Awareness Week
- Farewell to Forecaster: Retirement

### Office Leadership

#### Meteorologist in Charge

Gary Woodall

#### Warning Coordination

#### Meteorologist

Ken Waters

#### Science and Operations

#### Officer

Doug Green

Questions: w-

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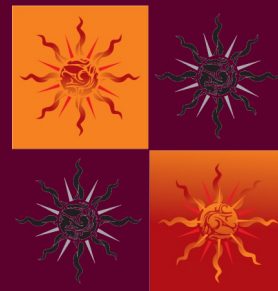
By Charlotte Dewey, Meteorologist Intern

We're into winter here in the desert southwest and that means cooler temperatures. Some good things coming up this spring like National Flood Awareness Week, the return of our Skywarn Spotter Classes as well as a recap of weather statistics in 2011.

We look forward to many more newsletters coming out with great information that will hopefully be helpful and informative.



Image credit Arizona Highways Magazine 2001



## 4th Annual SAWS Workshop Review and New Forecast Service for Scottsdale Airport

By Jessica Nolte, Meteorologist/Assistant Aviation Program Manager

This last October, the Phoenix National Weather Service office in partnership with the Albuquerque National Weather Service office and the Albuquerque Center Weather Service Unit (CWSU) hosted the 4<sup>th</sup> Annual Southwest Aviation Weather Safety (SAWS) Workshop in Albuquerque, New Mexico. Over 90 pilots, air traffic controllers, meteorolo-

gists, weather briefers and others involved in the aviation industry met during a two day workshop in efforts to promote aviation weather safety and share information from across different user levels and platforms. The first workshop day was deemed "Aviator Day" where the presentations were geared towards pilots and controllers, providing case studies and best practices/technologies related to aviation and weather awareness. "Aviator Day" concluded with a tour of the Albuquerque Air Route Traffic Control Center (ARTCC) and co-located CWSU. The second workshop day was focused more towards the meteorologists (but several folks from the Aviator day stayed for the second day!) with presentations ranging from forecasting techniques for aviation hazards as well as some informative talks from private sector (i.e. Southwest Airlines and other private companies) meteorologists. SAWS IV was a great success and if avia-

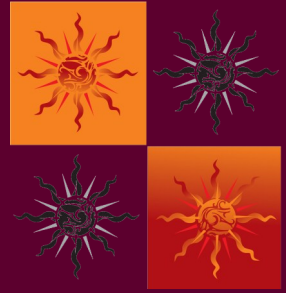
tion weather and awareness interest you, we hope you join us for the next SAWS workshop! SAWS V will be held next year (2013) in Southern California by the Los Angeles Weather Forecast Office and the LA CWSU.

Starting this spring, a new terminal aerodrome forecast (TAF) service will begin for the Scottsdale Airport (FAA ID KSDL). The Scottsdale Airport is located south of Frank Lloyd Wright Blvd between Scottsdale and Hayden Roads in north Scottsdale. We are still in the planning stages for this new service, but are excited to be introducing this for our aviation customers. Finalized details and specifics about the new TAF will be posted on our website, [www.weather.gov/phoenix](http://www.weather.gov/phoenix) in the coming weeks.



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TAFPHX
TAF
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Sample of a TAF for Phoenix Sky Harbor Airport



## Climate Year in Review: 2011

By Paul Iniguez, Forecaster/Climate Services Program Manager

The year 2011 in Phoenix ended as the (tie) 14th warmest year on record (since 1896) and the 21st driest.

Phoenix	2011 Value	Rank
Avg. High	87.1°F	Tied 14th
Average	75.2°F	Tied 14th
Avg. Low	63.3°F	18th Warmest
Rainfall	4.66"	21st Driest

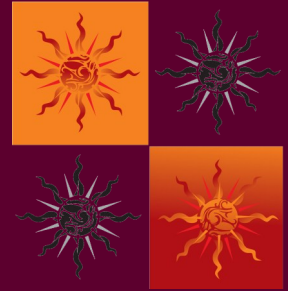
The year started on an exceptional cold note as the high on January 1 was a chilly 49 °F, fourth coldest start to a year on record and the coldest start to a new year in half a century (record low maximum remains 47 °F in 1906). The low temperature at the dawn of the new year dipped below freezing (30 °F) at Phoenix Sky Harbor International Airport

(KPHX) - an unusual event happening only 14 other times since 1980. While temperatures moderated back into a more typical range for the rest of January, another abrupt cold snap marked the beginning of February. The high temperature on February 2 was just 44 °F, which set not only a new record low maximum temperature for the date but even marked the coldest high temperature ever recorded during the month of February! Two additional sub-freezing mornings were observed at KPHX (30 °F) on February 3 and 4, making for the coldest back-to-back mornings in February since 1985. Temperatures did warm heading into spring, with the second earliest 100 °F day on record occurring on April 1 (record earliest is March 26, 1988).

Little rain accompanied the often cold pattern across the Southwest. From January 1 through June 30, Phoenix received just 1.04", well below the normal of 3.23" and the 11th driest first half of a year on record.

The summer heat cranked up early, with the 22nd warmest June on record, followed by the (tied) 12th warmest July and finally a brutal August that was not only the warmest August on record but also tied July 2009 as the warmest of any month (July is typically hotter than August). The summer as a whole tied for the 2nd warmest on record, with fourteen daily temperature records set or tied, including the all-time hottest August day on record (117 °F on August 26). (continued)



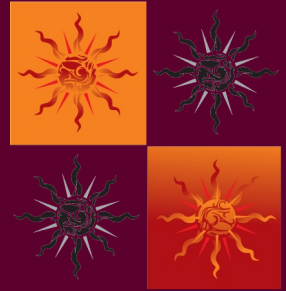


## Climate Review (Continued)

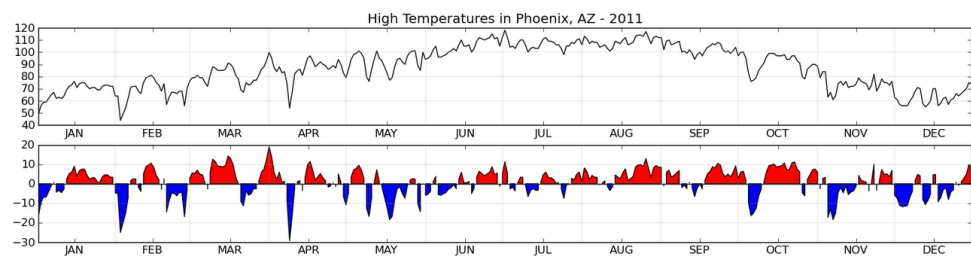
The 2011 Monsoon season, defined as encompassing the period June 15-September 30, was the hottest on record at Phoenix. The average temperature, 95.0 °F, broke the previous record of 94.5 °F established in 2007. The average maximum temperature, 106.7 °F, also set a new record, eclipsing the previous record of 106.4 °F established in 1989, while the average minimum temperature, 83.3 °F, was the second-warmest on record (83.4 °F in 2007). The fact that the average maximum temperature was hottest on record is particularly significant, since daytime high temperatures over the nearby open desert south and west of Phoenix are typically as hot as what occurs at Phoenix's official observation site at Sky Harbor International Airport (urbanization does not have a great impact on high temperatures, although it has a significant impact on nighttime low temperatures and, therefore, average temperatures). Rainfall at KPHX totaled only 0.19" for August-September, which tied for the 6th driest amount on record. Monsoon rainfall totaled 1.60" at KPHX, 36th driest on record. The lack of rainfall during the summer and preceding months resulted in numerous dust storms plaguing central Arizona, including a particularly large one on July 5th that garnered international media attention.

Quickly after the monsoon came to an end, several prolonged periods of cool, cloudy, and at times wet weather set in across the Southwest. The wetter-than-average December was not entirely expected as a moderate La Nina was underway which typically brings about drier conditions for Phoenix. However, the La Nina/ENSO signal was partially overridden by several periods of a strongly positive Arctic Oscillation. A positive Arctic Oscillation usually exhibits a pattern that brings wetter weather to the Alaska region with high pressure at midlatitudes and drives ocean storms farther north.

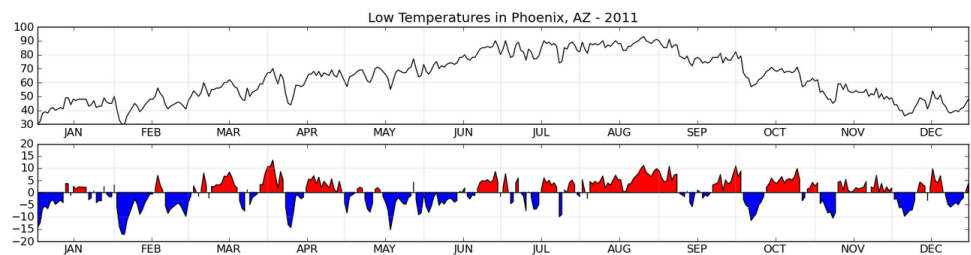
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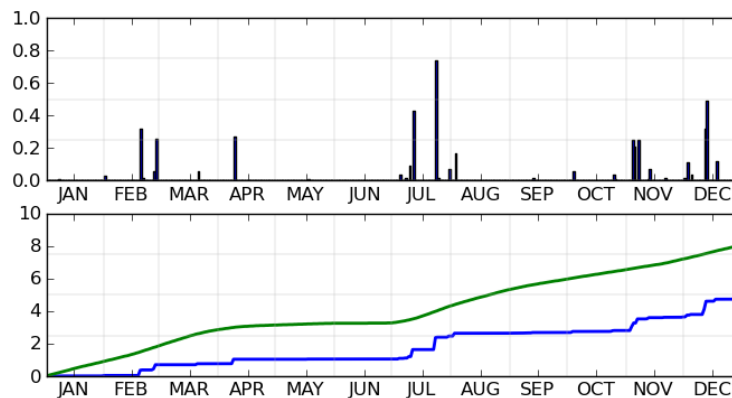
## Climate Review (Continued)



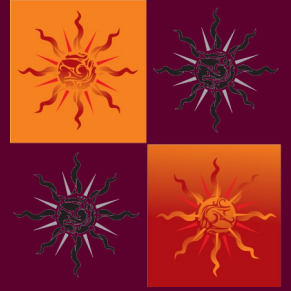
*Observed daily high temperatures (°F) at Phoenix Sky Harbor Airport (top) and departure from normal (bottom) for 2011.*



*Observed daily low temperatures (°F) at Phoenix Sky Harbor Airport (top) and departure from normal (bottom) for 2011.*



*Observed daily precipitation (inches) at Phoenix Sky Harbor Airport (top). Bottom graph represents accumulated daily precipitation (blue line) and normal (green line).*



## National Flood Awareness Week

By Mike McLane, Senior Service Hydrologist

March 12-16<sup>th</sup> has been designated National Flood Awareness Week. The purpose of this campaign is to increase public awareness of the many ways floods can occur, the hazards associated with floods, and actions that can be taken to save life and property.

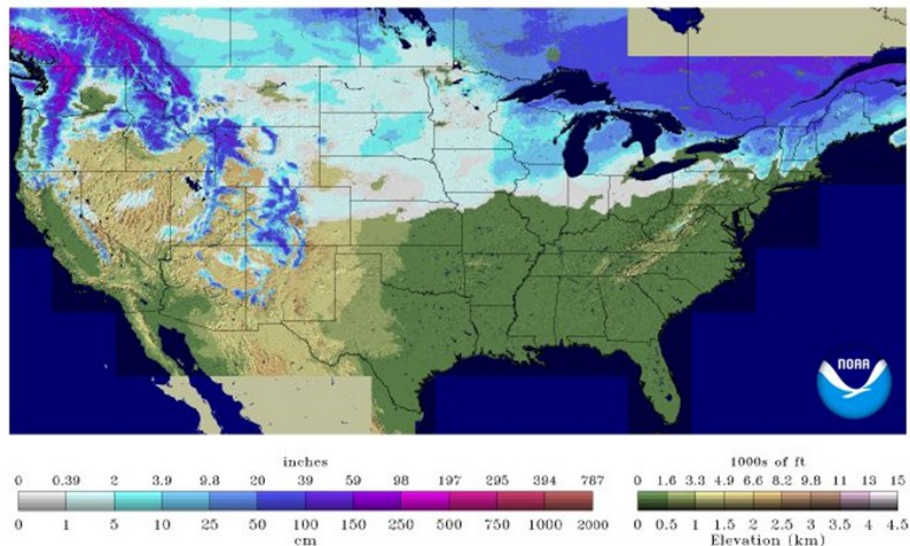
Here in the United States flooding causes more damage than any other severe weather related hazard, averaging around \$5 billion a year. No region is immune, with flooding being documented in all 50 states and U.S. Territories.

Flooding can occur year round. For many states the highest frequency of flooding occurs during the spring snowmelt season. Rapid melt of snow, often accompanied by warm spring rains, often results in significant flooding of rivers and streams. The floods that occurred along the Mississippi, Ohio, and other rivers in the spring of 2011 were unprecedented in their magnitude, with new record flood levels being set at many locations.

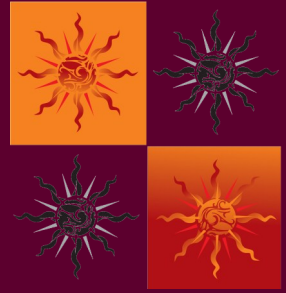
The figure below, from the National Operational Hydrologic Remote Sensing Center (NOHRSC) shows snow depth across the nation as of January 18<sup>th</sup>, 2012. Although there are some areas with good snowpack, most of the nation has little or no snow at this time. There are still a few weeks for snow to accumulate before the peak melt season, though as it currently stands it appears the risk of spring flooding for most areas will be less this year than in 2011. (continued)

National Snow 2011-  
Analysis 2012

Snow Depth  
2012-01-18 06





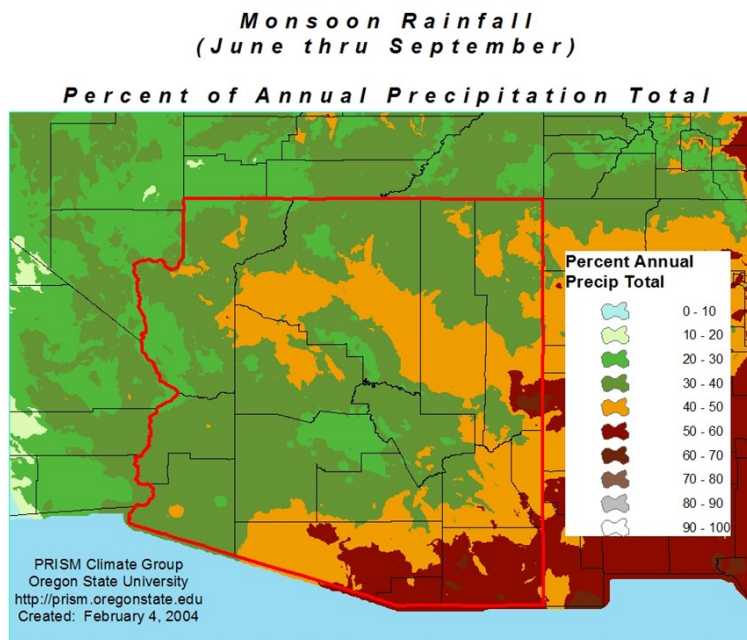


## Flood Awareness (Continued)

Here in the desert southwest spring is usually one of the driest times of the year. Although there is often snow in the higher elevations of the state, spring snow melt is not a significant contributor to river flooding. Melting snow pack can, however, help to increase precious water supply storage in area reservoirs.

Flooding in Arizona, by contrast, normally occurs during the convective or monsoon season. The monsoon season runs from June 15<sup>th</sup> to September 30<sup>th</sup>, though convective, heavy

rain producing storms, can occur outside of this period. The graphic below depicts the percentage of annual precipitation that falls during the months of June, July, August, and September.

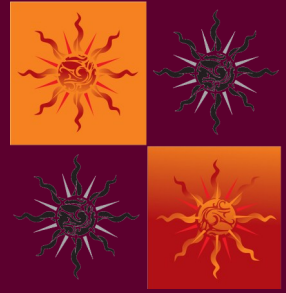


In the lower deserts of east-central Arizona 30 to 40 percent of annual precipitation falls during these four months. Monsoonal flow usually hasn't established itself until the end of June and often is winding down by early September. The bulk of the precipitation that falls during the monsoon season, therefore falls during the two months of July and August.

The monsoon has a greater impact on precipitation in extreme southeast Arizona, where greater than 50 percent of the annual total

falls during this period.

High rainfall amounts and high rainfall rates can result in flooding. Flooding that occurs in the desert southwest is usually classified as "flash" flooding, and not river flooding. Flash flooding is defined as a flood which occurs within six hours of a rain event, or after a dam or levee failure, or following a sudden release of water held by an ice or debris jam. In a flash flood creeks, streams, normally dry washes, and many roadways that cross these drainages can become quickly inundated with flood waters. Flash floods occur quickly and can catch people unprepared. (continued)



## Flood Awareness (Continued)

The National Weather Service issues Flash Flood Warnings when flash flooding is occurring or forecast to occur. You will, however, not always have a warning that these deadly, sudden floods are coming. If you live in areas prone to flash floods it is important to stay alert for flood waters and stay informed when convective storms threaten by monitoring NOAA Weather Radio or your favorite media source.

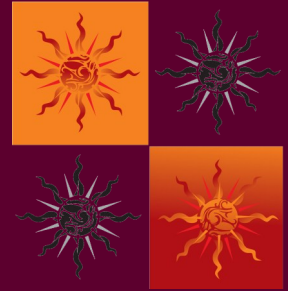
Should you encounter a flooded roadway, do not drive into flood waters. It takes very little flowing water to sweep a vehicle off the road. Either wait until water subsides or Turn Around – DON'T DROWN! If that isn't enough incentive, Arizona also has a "**Stupid Motorist Law**" (Section 28-910 of the Arizona Revised Statutes) which states that any motorist who becomes stranded after driving around barricades to enter a flooded stretch of roadway may be charged for the cost of his/her rescue.

For more information on National Flood Safety Awareness Week and to obtain additional flood safety information go to the National Weather Service Flood Safety Web Page at:

<http://www.nws.noaa.gov/floodsafety/index.shtml>







## Dual-Pol Radar Research

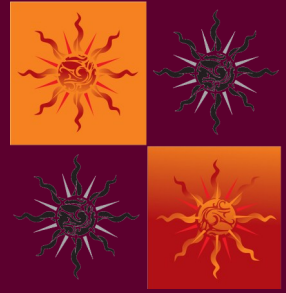
By Elizabeth Padian, Student Intern

As many of you know, the Weather Forecast Office (WFO) in Phoenix received the Dual-Pol radar upgrade to the existing WSR-88D in the spring of 2011. This came just in time for the beginning of the Southwest Monsoon that officially started on June 15th. This season brought a lower than normal level of activity of thunderstorms, but, brought a dust storm that caught the attention of the entire nation. However, with the new Dual-Pol data being ingested into our computers, the forecasters in the office were able to see these events under a new light.

Dual-Polarization radar transmits radio waves in both horizontal and vertical directions, being able to analyze targets more thoroughly. This will help improve estimation of precipitation amounts, types and rates, as well as differentiating between non-meteorological targets such as birds.

Although I am the new student intern here in Phoenix, I was able to take a look at everything Dual-Pol has to offer. As the season came to and end, many individuals in the office as well as around the National Weather Service were interested in seeing how well the upgraded radar performed. Also, they want to see what additional information it is able to give to the forecasters when they are making decisions. This curiosity led to my decision to take a small portion of this “question” and investigate. After some guidance from my professors at my University, Gary Woodall (the Meteorologist in Charge), and others, I finally decided to see how well the Hydrometeor Classification (HC) algorithm performed in this unique desert climate.

While this project is still in progress, the intention is to review all the local storm reports (LSRs) received throughout the entire monsoon and see which ones have significance. The Hydrometeor Classification attempts to figure out whether or not the radar is “looking” at rain, heavy rain, hail, snow and other parameters. Using the ground truth from the LSRs, I will be attempting to quantify how well the HC algorithm is doing at detecting the different types of precipitation. This information will be useful in making the algorithms more accurate in the future and giving forecasters more insight in to how these and other products from the upgrade can help in day-to-day operations. I am excited to be working on this project and am looking forward to the information I will be able to share.



## NWS Phoenix is on Facebook!

Starting in April 2011, NWS Phoenix went live with a Facebook page. The NWS had created some other operational experimental pages that have been active since October of 2010, but as of spring 2011 the Phoenix National Weather Service office has a live Facebook page. This is a great addition to our decision support services and product dissemination to the public and our customers.

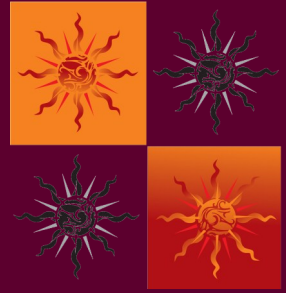
The page can be accessed here: [US National Weather Service Phoenix Arizona on Facebook](#). The page is designed to interact with local community, including highlighting upcoming significant weather events, sending out climate and weather information and promoting weather awareness activities.

As of January 25th, we have over 750 fans of our page. We look to continue to grow and increase this number. Various questions as well as weather pictures have been posted to the NWS Phoenix Facebook page.

There is also a link on the left hand column at the bottom of our home page ([www.weather.gov/Phoenix](http://www.weather.gov/Phoenix)) that will take you directly to our Facebook page.



**Like us on Facebook!**



## Air Quality in Phoenix

By Ken Waters, Warning and Coordination Meteorologist

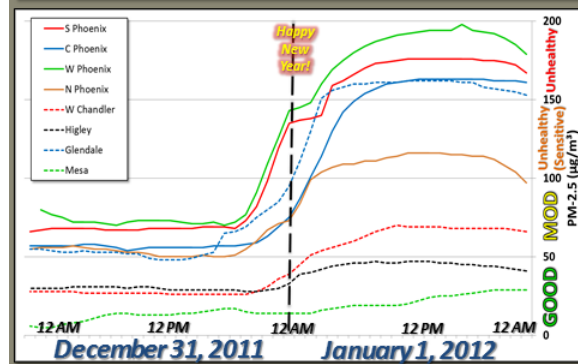
Air quality became a big issue again in the Phoenix area over the recent Christmas and New Years holidays. During that period high pressure settled in over south central Arizona creating a conducive environment for strong overnight inversions. Inversions are situations where cooler air becomes trapped below warmer air. These can be quite strong with dramatic differences where the temperature at the surface may be 10 to 20 degrees cooler than the temperature at only 1-2 thousand feet

above. Inversions prevent vertical circulation and often trap fog, haze, smoke, and pollutants. Local authorities in Arizona declared "no burn" days over both holiday weekends. Nonetheless there seemed to be a lot of overnight burning from fireplaces as well as smoke from fireworks over New Years Eve. The combination of the strong inversion and the continued burning created hazardous air quality for the public. Over both weekends the Arizona Department of Air Quality sensors indicated unhealthy air for PM-2.5 for the overnight periods with values exceeding 150 micro-grams per cubic meter. On 5 of the past 6 years (2006, 2007, 2009, 2010, and 2011) this level has been surpassed on Christmas morning. The presumption is that much of that is caused by fireplace burning.

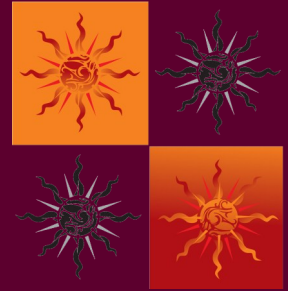
The National Weather Service currently issues High Pollution Advisories when requested by either the Maricopa or Pinal county air quality agencies. We are currently discussing with air quality agencies possible additional steps that may be taken to better alert the public to the importance of air quality and to help identify those periods when unhealthy air impacts the public. One of the biggest areas we will be looking at is various ways to detect the strength of the inversion, especially in the early evening when the diurnal inversion typically begins to set in.

### Why was the Air Quality So Bad in Phoenix?

Air quality was noticeably degraded across the Phoenix area to start the new year (images, right). Pollution levels were steady through most of the 31<sup>st</sup> but increased dramatically as the new year approached (chart, below). Weather conditions were steady between both days, though there was a bit more wind on the 1<sup>st</sup> which would have promoted better air quality and not worse. The likely source of the smoke and haze was wood-burning fireplaces and fireworks, as noted by the Arizona Dept. of Environmental Quality.







## Skywarn Spotter Program

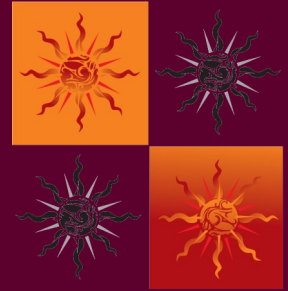
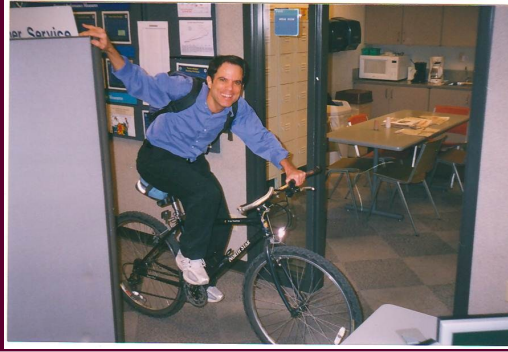
By Austin Jamison, Meteorologist/Spotter Focal Point

The 2011 Skywarn Spotter training program had it's biggest year ever. There were 34 classes conducted across every county of our forecast area. The classes were hosted by a variety of public safety/emergency management agencies and local amateur radio organizations. We had nearly 800 attendees with over 500 new to the program.

Spotters are volunteers that fulfill an essential role by providing the National Weather Service with critical ground truth observations of hazardous weather conditions. Their reports let us know if our warnings and advisories are on the right track or can alert us to conditions that will enable us to provide warning to the general public. The training class is comprised of a two hour multimedia presentation. Handouts are provided to supplement the content and serve as reference material. Spotters need to attend a class once every two years to stay current.

Arrangements for 2012 classes are underway and as details are finalized, announcements will be posted to our homepage. The first class of this year was conducted in Yuma on January 19th in cooperation with the Yuma Auxiliary Communications Service. The bulk of this year's classes will be in April and May. We look forward to expanding our network of Spotters throughout our forecast area and reconnecting with those already in the program!





## Farewell to a Phoenix Forecaster

By Craig Ellis, Lead Forecaster and Charlotte Dewey, Meteorologist Intern

*Working at the National Weather Service was a huge part of Craig's life and allowed him the opportunity to meet and work with some amazing people. This is the biography of Craig's career in the Weather Service and some background information on how his passion for weather came about. I was fortunate to work with Craig for two years here in Phoenix. Thank you for sharing this with us Craig! -Charlotte Dewey, Meteorologist Intern.*

Craig Ellis worked at the National Weather Service Phoenix, Arizona office for one third of a century as of October 26, 2011. While he was a student at UCLA, Craig first started working part-time for the National Weather Service in Los Angeles through a UCLA sponsored volunteer internship beginning in September 1974. His career with the National Weather Service officially began as a Student Trainee at the Weather Service Office (WSO) in Sacramento for 2 weeks in September 1977 just prior to his senior year at UCLA. He also worked as a Student Trainee at the Weather Service Forecast Office (WSFO) in Los Angeles during the UCLA Winter Break in December 1977. After receiving his Bachelor's degree in Meteorology from UCLA in June 1978, he started his full-time career as a Meteorologist Intern at the National Weather Service Forecast Office (WSFO) in Phoenix. He was promoted to Agricultural Meteorologist at WSFO Phoenix in December 1982. After the Agricultural Forecast program was turned over to the private sector in the summer of 1996, he was transferred to a General Forecaster position at the Weather Forecast Office (WFO) in Phoenix. Craig was promoted to Lead Forecaster at WFO Phoenix in December 2002. He continued in that position until he retired at the end of last year on December 31, 2011.

**\*\*To continue to the rest of the full article please visit: [this link here](#)\*\***